Event Mean Concentrations and Land Use

Presented to the SB 1295
Stormwater Commission
April 6, 2009

Paul M. Currier, PE, PG
DES Watershed Management Bureau Administrator

Event Mean Concentration (EMC)

- An EMC is defined as the total constituent mass discharge divided by the total runoff volume (EPA 1983)
- EMCs were developed by the EPA's Nationwide Urban Runoff Program (NURP) (1983) to serve as a national measure of the magnitude of urban runoff, specifically pollutant loadings

After Jacob and Lopez, 1992

EMC - Event Mean Concentration values for TSS, BOD, TN and TP in mg/l (Houston Area EMC Database)

GBNEP – 15
March 1992

LUCODE	DESCRIPTION	TSS	BOD	TN	TP
11	RESIDENTIAL	100	15	3.41	0.79
12	COMMERCIAL AND SERVICES	166	9	2.10	0.37
15	INDUST & COMMERC CMPLXS	166	9	2.10	0.37
16	MXD URBAN OR BUILT-UP	166	9	2.10	0.37
21	CROPLAND AND PASTURE	201	4	1.56	0.36
31	HERBACEOUS RANGELAND	70	6	1.51	0.12

After Jacob and Lopez, 1992

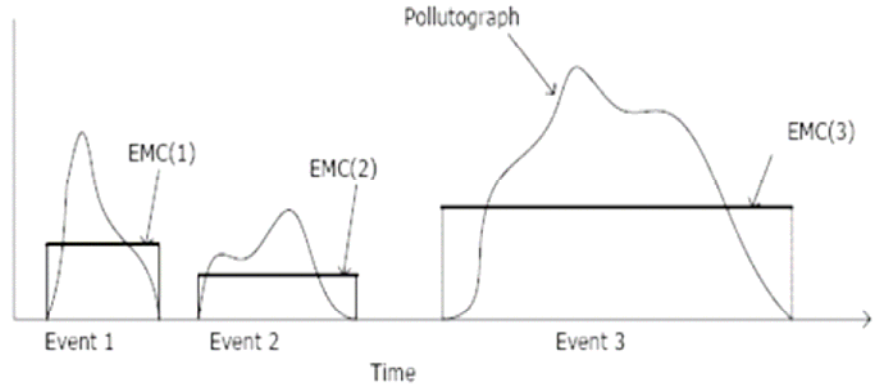
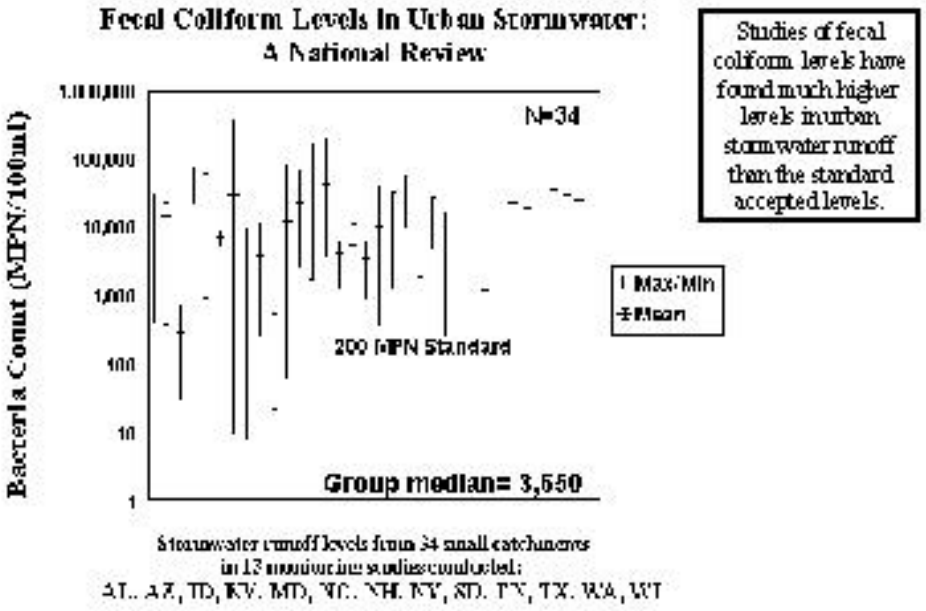


Figure 1 Inter-storm variation of pollutographs and EMCs.

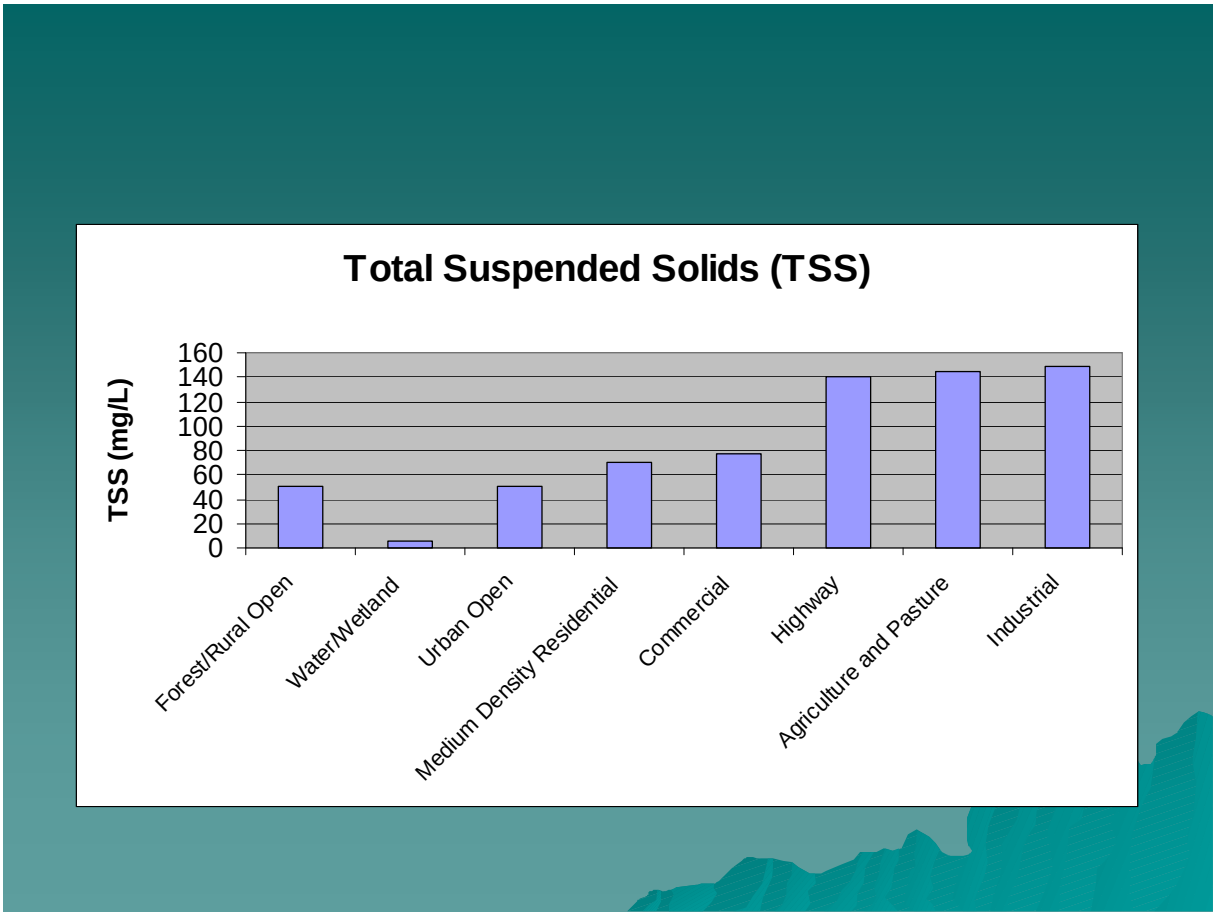
A Review of Event Mean Concentration (EMC) for Urban Stormwater Runoff

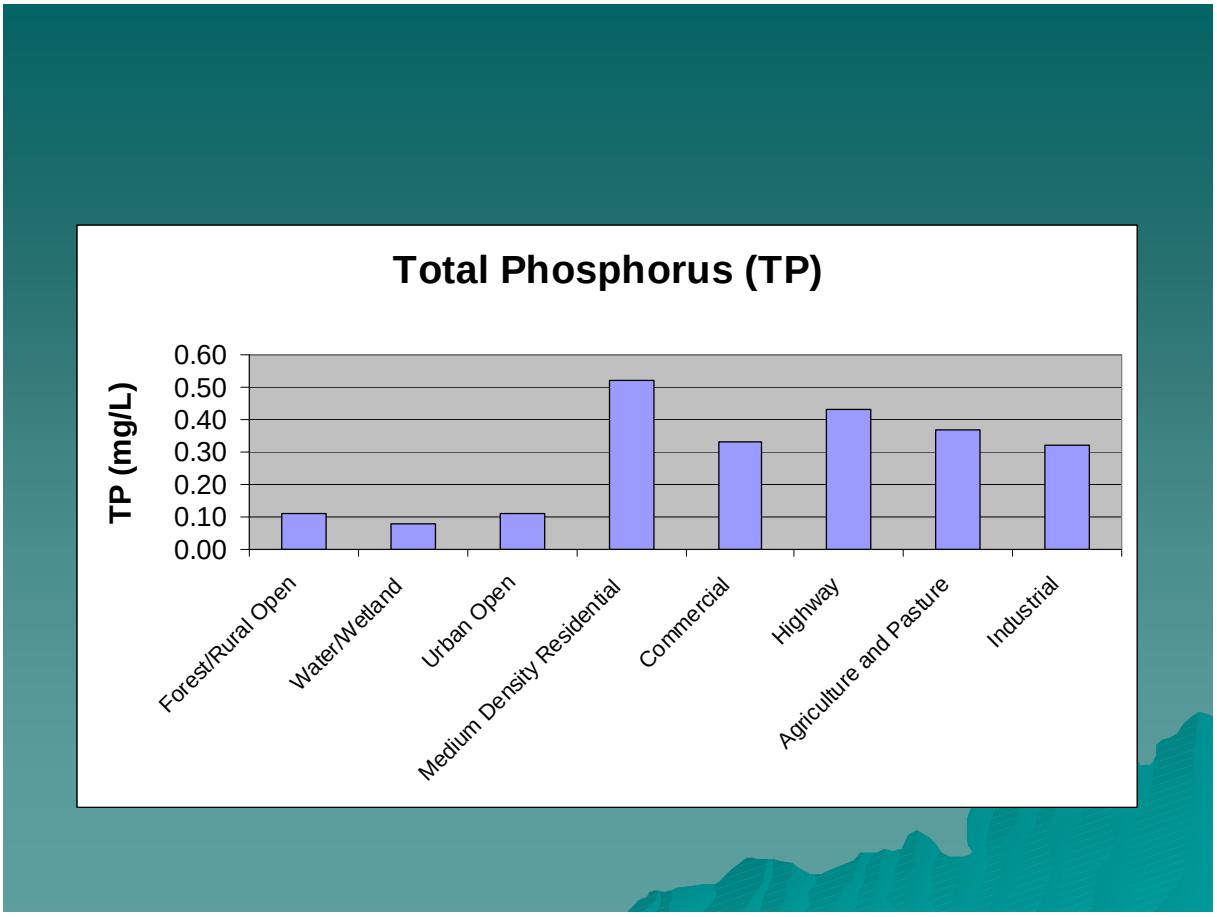
M.F. Chow*, Z. Yusop
[1]Institute of Environmental & Water Resource Management (IPASA), Universiti Teknologi Malaysia, 81310 Skudai, Johor Darul Ta'zim, Malaysia
*Corresponding author. Phone: +6017 775 4287, Fax: +607 553 1575
Email: mingfai1983@yahoo.com

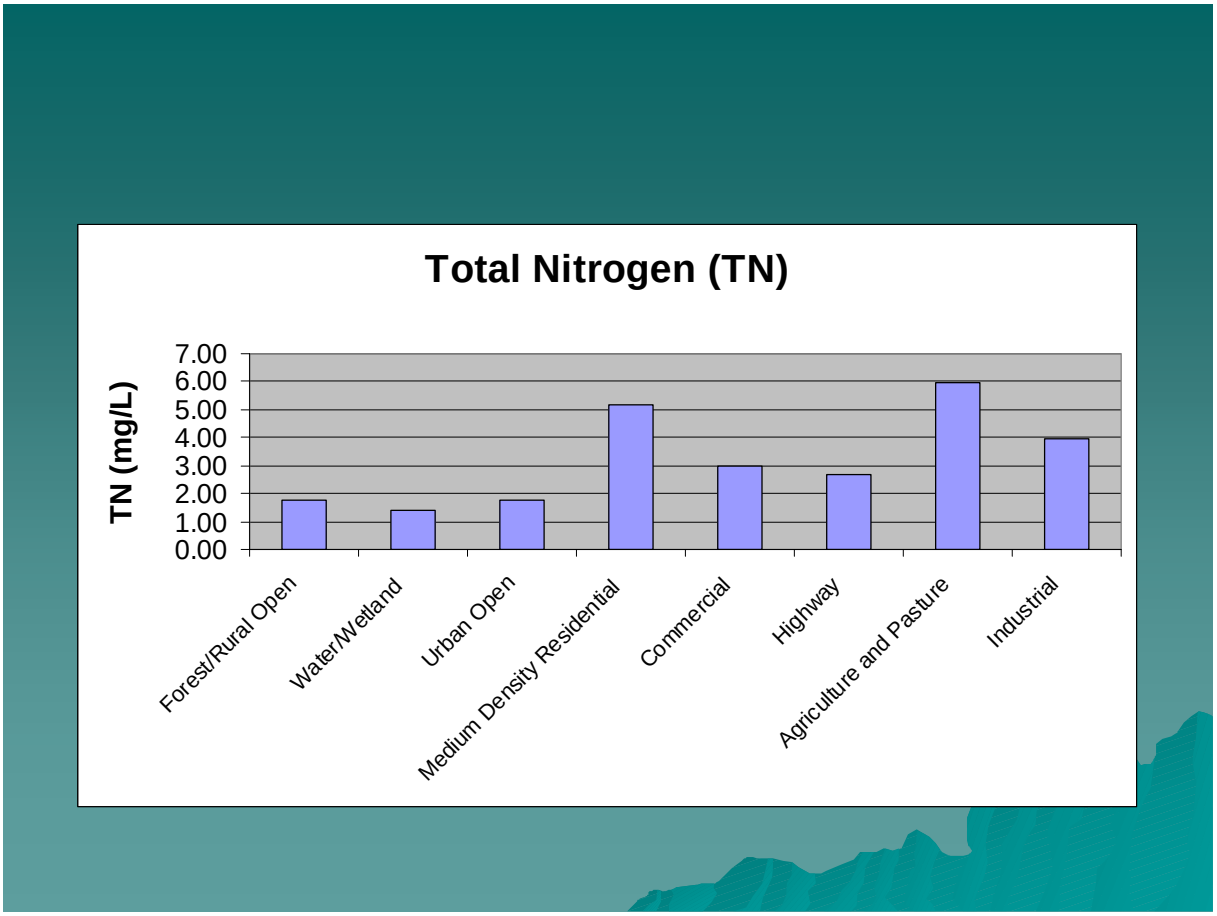


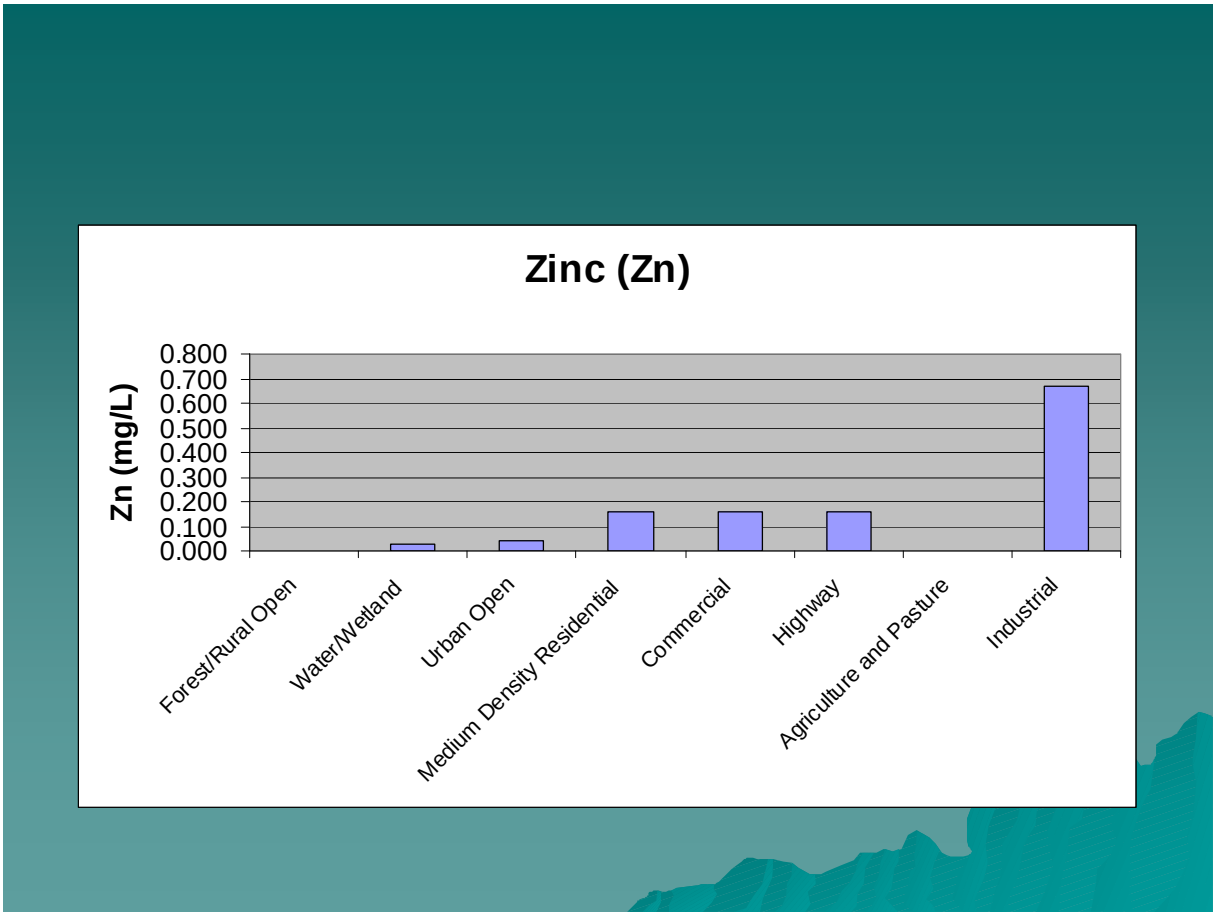
EMCs Ranking by Land Use (lowest to highest concentration)

Land Use	TSS	TP	TN	Zn
Forest/Rural Open	2	2	2	1
Water/Wetland	1	1	1	3
Urban Open	3	3	3	4
Medium Density Residential	4	8	7	7
Commercial	5	5	5	6
Highway	6	7	4	5
Agriculture and Pasture	7	6	8	2
Industrial	8	4	6	8


Total Suspended Solids (TSS)
TSS (mg/L)
160
140
120
100
80
60
40
20
0
Forest/Rural Open
Water/Wetland
Urban Open
Medium Density Residential
Commercial
Highway
Agriculture and Pasture
Industrial


Total Phosphorus (TP)
TP (mg/L)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Forest/Rural Open
Water/Wetland
Urban Open
Medium Density Residential
Commercial
Highway
Agriculture and Pasture
Industrial


Total Nitrogen (TN)
TN (mg/L)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Forest/Rural Open
Water/Wetland
Urban Open
Medium Density Residential
Commercial
Highway
Agriculture and Pasture
Industrial


Zinc (Zn)
Zn (mg/L)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Forest/Rural Open
Water/Wetland
Urban Open
Medium Density Residential
Commercial
Highway
Agriculture and Pasture
Industrial

8-1. The Simple Method

Many models are available to estimate pre- and post-development pollutant loads, such as the STEPL, AVGWLF, WINNSLAMM, and the P8 Urban Catchment Model. Each model varies in strengths and weaknesses. NHDES is reviewing various models and will consider the use of other models if proposed. At this time, however, NHDES recommends using the "Simple Method", a spreadsheet based calculation, for comparing pre-development to post-development pollutant loads.

From NH Stormwater Manual
December 2008

SIMPLE METHOD

1. Annual loads are computed for the pre-developed condition based on pre-development pollutant loading values;

2. The annual loads from the proposed development are computed based on the proposed level of impervious cover and the appropriate loading factor for the applicable land use.

3. The desired condition is POST DEVELOPMENT LOAD <= PRE

4. If not (and not impaired or Outstanding Resource Water), then antidegradation policy applies.

5. Draft AoT regulations did not require loading analyses if % EIC was < 10% and % UDC was > 65% (assumes minor increase in loads will not harm aquatic life)

Table A.2 Pollutant Concentration from Different Source Areas/Land Uses							
Constituent	**TSS[1]**	**TP[2]**	**TN[3]**	**F Coli[1]**	**Cu[1]**	**Pb[1]**	**Zn[1]**
Units	mg/l	mg/l	mg/l	1,000 col/ ml	ug/l	ug/l	ug/l
Residential Roof	19	0.11	1.5	0.26	20	21	312
Commercial Roof	9	0.14	2.1	1.1	7	17	256
Industrial Roof	17	-	-	5.8	62	43	1,390
Commercial/Res Parking	27	0.15	1.9	1.8	51	28	139
Industrial Parking	228	-	-	2.7	34	85	224
Residential Street	172	0.55	1.4	37	25	51	173
Commercial Street	468	-	-	12	73	170	450
Rural Highway	51	-	22	-	22	80	80
Urban Highway	142	0.32	3.0	-	54	400	329
Lawns	80	2.1	9.1	24	17	17	50
Landscaping	37	-	-	94	94	29	263
Driveway	173	0.56	2.1	17	17	-	107
Heavy Industrial	124	-	-	-	148	290	1600
Residential (general)[4]	100	0.40	2.2	-	-	18	37
Commercial (general)[4]	75	0.20	2.0	-	-	370	250
Industrial (general)[4]	120	0.40	2.5	-	-	-	-

Sources:
1: Claytor and Schueler (1996)
2: Average of Steuer et al. (1997), Bannerman (1993) and Waschbusch (2000)
3: Steuer et al. (1997)
4: Caraco (2001), default values averaged from several individual assessments